MURIATIC ACID (Aqueous Hydrochloric Acid)

Burner Grade

CAS Number:	7647-01-0
Synonyms:	hydrochloric acid, Muriatic acid, HCl
Chemical Formula:	HCl, aqueous
Molecular Weight:	36.46
Description:	Muriatic acid is a clear, colorless to slightly yellow liquid and has a pungent irritating odor.

Refer to the Safety Data Sheet (SDS) for additional information and before handling this material.

Product Overview

Muriatic acid is an aqueous hydrogen chloride solution and is considered strong and highly corrosive. It is classified as a common mineral acid that has a variety of industrial uses. Westlake produces burner grade muriatic acid at five plants across North America (Lake Charles, Louisiana; Natrium, West Virginia; Longview, Washington; Beauharnois, Quebec, Canada; and Calvert City, Kentucky) and in several concentrations. Burner grade acid is produced in dedicated purpose-built production lines to create a quality product that is ideal for applications in which a reliable, tightly specified, high purity acid is essential to the final product. Muriatic acid is also produced in North America by other suppliers as a "byproduct" of other chemical processes. Byproduct acid can have higher levels of impurities, and availability can vary depending on the inherent parent production process.

Production

Westlake produces its commercial aqueous hydrochloric acid, or muriatic acid, directly via dedicated burner units. This burner acid is produced by reacting chlorine and hydrogen derived during the chlor-alkali production process to provide a reliable, on-demand supply of high quality, pure hydrochloric acid. In this process, hydrogen and chlorine are passed through a burner nozzle and ignited in a graphite combustion chamber to produce clean, high quality gaseous hydrogen chloride per the following reaction:

$$H_2 + Cl_2 \rightarrow 2HCl$$

The effluent gas is cooled, absorbed in demineralized water, and then diluted to specified concentrations. Concentration of the acid is typically expressed in "degrees Baumé," which is based on the specific gravity of the product and, therefore, correlates with the percent concentration of hydrochloric acid (HCl) in the solution. The relationship between degrees Baumé and HCl is shown in the following table.

Approximate HCl Concentration	Degrees Baumé
26.5 % - 29.5%	18
29.0 % - 31.0%	19
31.5 % - 32.9%	20
35.2 % - 36.2%	22
37.1% - 38.0%	23

Uses

As one of the common mineral acids, muriatic acid has a variety of merchant uses. It is commonly used as a strong non-oxidizing acid in industrial segments. The most common uses of muriatic acid are in food processing, oil and gas well acidizing, chemical production, and steel pickling. Westlake's burner-grade muriatic acid makes it ideal for use where consistency and purity are key to the final product. With all downstream applications, appropriate registrations and/or approvals may be required. Possible uses are described in more detail below:

- **Steel and Metals Producers** - The steel and metal industry use muriatic acid for pickling steel to remove mill scale (or surface oxides). Most steel is also cleaned, or fluxed, in acid before galvanizing, tinning, and other coating applications.
- **Petroleum and Natural Gas** - The oil and gas industry uses muriatic acid to acidize oil and gas wells. The acid increases and stimulates oil and gas production by dissolving calcium and magnesium carbonate bedrock to produce fissures, or pores, in the oil bearing rock formation. These pores increase permeability to facilitate oil and gas flow into the well casing. Muriatic is a key ingredient in fluids specifically designed to fracture (or "frac") shale formations to liberate natural gas and oil.
- **Pharmaceuticals** - The pharmaceutical industry consumes muriatic acid as a catalyst, chemical reactant, pH control, water treatment, and as a reducing agent in the production of active pharmaceutical ingredients.
- **Organic Chemical Synthesis** - Chemical manufacturers react muriatic acid to form chlorides and hydrochloride salts or as a pH regulator for process and effluent streams.
- **Water and Wastewater Treatment** - Muriatic acid is used to control pool water and industrial waste water pH and to clean commercial pool plasters and masonry.
- **Brine Treatment** - Muriatic acid is used to purify and adjust the pH of brine prior to chlor-alkali (chlorine/sodium hydroxide) production.
- **Food Additives and Processing** - The food industry uses muriatic acid in a variety of products, the majority of which is the production of high fructose corn syrup. It is also used to produce vitamin supplements in animal feed, saccharin and aspartame, and in the processing of gelatin, vegetable and fruit juices, and canned goods.
- **Ore and Mineral Processing** - Mining operations use muriatic acid for ore treatment, extraction, separation, purification, and water treatment. Mineral processing requires muriatic acid for the recovery of gold and molybdenum. It is also used in potash ore, zirconium, uranium and tungsten metal production.

Health Effects

Read and follow all instructions on the Product Label and review the Safety Data Sheet (SDS) to understand and avoid the hazards associated with muriatic acid. Wear appropriate personal protective equipment and avoid direct contact. Eye contact with muriatic acid causes serious eye damage; repeated or prolonged exposure to corrosive materials or fumes may cause conjunctivitis. Skin contact causes severe burns; repeated or prolonged exposure to skin will cause dermatitis. Muriatic acid is harmful if swallowed and may cause irreversible damage to mucous membranes; repeated or prolonged exposure to corrosive materials or fumes may cause gastrointestinal disturbances. Inhalation of muriatic acid may cause respiratory irritation; repeated or prolonged exposure to corrosive fumes may cause bronchial irritation with chronic cough.

The United States Occupational Safety and Health Administration (OSHA) and the American Conference of Governmental Industrial Hygienists (ACGIH) have established or recommended occupational airborne exposure limits for muriatic acid. The OSHA Permissible Exposure Limit (PEL) is a Ceiling Limit of 5 ppm (parts per million) and the ACGIH Threshold Limit Value (TLV) is a Ceiling Limit of 2 ppm. A Ceiling Limit should not be exceeded during any part of the working exposure.

Before handling, it is important that engineering controls are operating and protective equipment requirements and personal hygiene measures are being followed. People working with this chemical should be properly trained regarding its hazards, safe use, review the SDS, and be given the opportunity to review this document.

Environmental Effects

Muriatic acid should be kept out of lakes, streams, ponds, or other water sources. Muriatic acid does not bioaccumulate due to its high solubility in water.

Exposure Potential

Precautions should be taken to minimize potential harm to people, animals and the environment. Potential for exposure may vary depending upon site-specific conditions. When handling muriatic acid, refer to the SDS and Product Label and follow all instructions and warnings. Based on the expected uses for muriatic acid, exposure could be through:

- **Workplace exposure** - Exposure can occur either in a muriatic acid manufacturing facility or in the various industrial facilities that use muriatic acid in other manufacturing or industrial processes. When exposures occur, they are most frequently to the skin and eyes, although oral exposure and ingestion are possible. Good industrial hygiene practices and the use of personal protective equipment will, when combined with proper training and environmental, health and safety practices, contribute to a safe work environment.
- **Environmental releases** - In the event of a spill, contain the spill to prevent contaminated soil, surface or ground water. Muriatic acid can significantly decrease the pH of soil and/or water. Industrial spills (releases to soil or water) should be controlled by workplace spill programs which include containment around loading and unloading operations and storage tanks and employee training. Many aspects of a spill control program are mandated by federal, state and local requirements. In addition, if a spill occurs, governmental reporting may be required. Refer to the SDS for instructions to contain and clean up a spill to minimize exposure.
- **Consumer exposure** - Muriatic acid is not sold directly to consumers; however it is an ingredient in some consumer products. Westlake cannot and does not make any representation or conclusion about consumer exposure risks associated with its customers' products. In any case, keep all chemical products out of the reach of children.

Safe Handling and Storage

Always take precautions to minimize potential harm to people, animals, and the environment. When making solutions or diluting, muriatic acid should only be added slowly to the surface of cold water while stirring. Add the acid slowly with agitation to prevent local hot spots. Avoid contact with alkalis as this may cause violent reactions.

Muriatic acid attacks certain metals; the reaction may be dangerous because hydrogen is generated and may introduce an explosion hazard. Bulk storage tanks should be constructed of corrosion-resistant materials such as rubber or glass-lined steel, fiberglass, or plastic and should be vented to a scrubber to remove acid fumes.

Packaging and Shipping

Westlake ships muriatic acid in tank cars and tank trucks.

- **Tank car** - Single compartment rail cars are available with nominal capacities of 95 – 100 wet tons.
- **Tank trucks** - Westlake ships muriatic acid in bulk tank trucks with a capacity of approximately 22.5 wet tons in the United States and from 22.5 to 37 wet tons in Canada.

Fire and Explosion Hazards

Muriatic acid by itself is nonflammable and nonexplosive. However, muriatic acid attacks many metals producing extremely flammable hydrogen gas which can form explosive mixtures with air.

During a fire, promptly isolate the scene by removing all persons from the vicinity of the incident. No other action shall be taken without suitable training. Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode. Fire water contaminated with this material must be contained and prevented from being discharged to any waterway, sewer or drain.

Physical and Chemical Properties

Muriatic acid is a clear, fuming liquid with an irritating odor. It is completely miscible with water. When mixing with water, extreme heat of reaction will occur. Always add small amounts of acid to large amounts of water, with constant agitation to allow heat to dissipate. Vapor from the acid is highly irritating to the respiratory tract.

Typical Properties of Muriatic Acid	18 Baume	20 Baume	22 Baume	23 Baume
Concentration Range (% HCl)	26.5 - 29.5	31.5 - 32.9	35.2 - 36.2	37.1 - 38.0
Boiling Point	100°C	84°C	61°C	48°C
Freezing Point	-58°C	-44.5°C	-32°C	-27°C
Vapor Pressure (mm Hg)	14	24	100	150
Specific Gravity	1.142	1.160	1.179	1.189
Bulk Density (lbs./gal @ 15.6°C)	9.5	9.7	9.8	9.9

Regulatory Information

The following regulatory information is provided as a supplement to the information already included on the muriatic acid SDS.

North American Regulatory Information

- **CONEG Regulation/Model Toxics in Packaging Legislation** - Lead, cadmium, mercury and hexavalent chromium are not intentionally added to muriatic acid, and based on the formula and Westlake's experience with the product, the sum of the incidental concentration levels of these metals is not expected to exceed 100 parts per million (ppm) by weight.
- **RCRA** - Commercial grade muriatic acid, if discarded or spilled, as well as other wastes generated during use of muriatic acid or containing muriatic acid may exhibit one or more hazardous waste characteristics under 40 CFR 261.24, including D002 - corrosive. (Note: Westlake provides information on U.S. hazardous waste criteria for the product as manufactured. It remains the obligation of the user to evaluate their specific waste and to manage, treat, and dispose of unused material, residues, and containers in accordance with applicable federal, state, and local requirements.)
- **VOC Information** - Muriatic acid does not contain constituents that qualify as volatile organic compounds (VOC) based on the definition in 40 CFR 51.100.
- **HAP Information** - Muriatic acid (hydrochloric acid) is listed as a hazardous air pollutant (HAPs) in the Clean Air Act Amendments of 1990, 42 USC 7412 (b).

- **Ozone-Depleting Chemicals** - Muriatic acid is not/does not contain ozone depleting chemicals (40 CFR 82, Subpart A, Appendix F)
- **Toxic Pollutants / Priority Pollutants** – Muriatic acid is not listed as a toxic pollutant/priority pollutant in 40 CFR 401.15 and/or 40 CFR 423 Appendix A.
- **CERCLA Hazardous Substance** - Muriatic acid (hydrogen chloride) appears in the List of Hazardous Substances and Reportable Quantities table (40 CFR 302.4) with a reportable quantity (RQ) of 5,000 pounds (2270 Kg).
- **TSCA Information** - Muriatic acid is listed on the TSCA inventory as active under TSCA Section 8(b). This product is not currently subject to any rule or order under TSCA Sections 4, 5(a), 5(e), 6(a), 7, or 12(b).
- **California Proposition 65** –WARNING: This product can expose you to chemicals including arsenic, which are known to the State of California to cause cancer. For more information go to www.P65Warnings.ca.gov.
- **Washington State Children's Safe Product Act (CSPA)** – Muriatic acid may contain a component at trace levels that is listed under the Children's Safe Product Act (CSPA, 70.240 and WAC 173-334-130).
- **U.S. Food and Drug Administration** - Muriatic acid is Generally Recognized as Safe (GRAS) when used as a buffer and neutralizing agent and when used in accordance with good manufacturing practices (21 CFR 182.1057). While Westlake has in place standard operating procedures designed to ensure product quality and safe operations, Westlake does not certify to Good Manufacturing Practice (GMP) requirements as defined by 21 CFR 182.1057 for Westlake's muriatic acid manufacturing units.
- **FDA Bioterrorism Act of 2002 Section 305 (Registration of Food Facilities)** - The following facilities have been registered with the FDA: Beauharnois, Quebec, Canada; Calvert City, Kentucky, USA; Lake Charles, Louisiana, USA; Longview, Washington, USA; and New Martinsville, West Virginia, USA

European Regulatory Information

- **RoHS/WEEE** - Muriatic acid has been reviewed with regard to the EU Directive 2011/65/EU "Restriction on the Use of Certain Hazardous Substances" (RoHS 2). Based on our knowledge of this product and information on the raw material suppliers' SDSs, this product does not contain cadmium, hexavalent chromium, lead, mercury, polybrominated biphenyls (PBBs) or polybrominated diphenyl ethers (PBDEs) at levels greater than the tolerated maximum concentration values established by the directive.
- **Europe REACH –** Muriatic acid (hydrogen chloride) is considered a substance under REACH. Muriatic acid does not contain Substances of Very High Concern (SVHC) as published in accordance with Article 59(10) of the REACH Regulation as of July 2017, nor does this product contain any substances on Annex XIV (Authorisation List). Westlake has not registered or arranged for an Only Representative to hold a registration for muriatic acid in accordance with the REACH regulations. Any importer of Westlake muriatic acid in the European Economic Area is responsible for compliance with applicable European REACH regulations or other member state requirements.
- **European Food Additive/Contact** – Muriatic acid is an approved Food Additive in the European Union as listed in EU No 231/2012 with the identifier E 507 when used in accordance with good manufacturing practices (Regulation (EC) No 2023/2006). While Westlake has in place standard operating procedures designed to ensure product quality and safe operations, Westlake does not certify to Good Manufacturing Practice (GMP) requirements as defined by Regulation (EC) No 2023/2006 for Westlake's muriatic acid manufacturing units.
- **Germany Federal Agency for Agriculture and Food BfR Recommendations on Food Contact Materials** – Muriatic acid is listed as approved for use in BfR Recommendations XIV, Polymer Dispersions; XV, Silicones; XLIV, Artificial Sausage Casings; and LII, Fillers (Additives for Fillers) when

used in accordance with good manufacturing practices. While Westlake has in place standard operating procedures designed to ensure product quality and safe operations, Westlake does not certify to Good Manufacturing Practice (GMP) requirements as defined by Regulation (EC) No 2023/2006 for Westlake's muriatic acid manufacturing units.

Asia-Pacific Regulatory Information

- **Australia Inventory of Chemical Substances (AICS)** - Muriatic acid is listed or compliant with the Australia Inventory of Chemical Substances.
- **China Inventory of Existing Chemical Substances (IECSC)** - Muriatic acid is listed or compliant with the China Inventory of Existing Chemical Substances.
- **Japanese Existing and New Chemicals Inventory (ENCS)** - Muriatic acid is listed or compliant with the Japanese Existing and New Chemicals Inventory.
- **Korean Existing Chemicals Inventory (KECI)** - Muriatic acid is listed or compliant with the Korean Existing Chemicals Inventory.
- **New Zealand Inventory of Chemicals (NZIoC)** - Muriatic acid is listed or compliant with the New Zealand Inventory of Chemicals.
- **Philippine Inventory of Chemicals and Chemical Substances (PICCS)** - Muriatic acid is listed or compliant with the Philippine Inventory of Chemicals and Chemical Substances.
- **Taiwan Existing Chemical Notification List** - Muriatic acid is listed or compliant with the Taiwan Existing Chemical Notification List.

Turkey Regulatory Information

- Westlake has not pre-registered or aranged for an Only Representative to hold a registration for muriatic acid in accordance with the KKDIK Regulation (Turkey REACH). Any importer of Westlake muriatic acid in Turkey is responsible for compliance with applicable KKDIK Regulation.

Product Certifications and Listings

- **NSF Standard 60 Drinking Water Treatment Chemicals** - Muriatic acid (hydrochloric acid) purchased from Westlake facilities has a Health Effects listing, and is certified for maximum use levels as noted on the NSF website, which can be viewed at www.nsf.org/certified/PwsChemicals.
- **Kosher Certification -** Westlake's muriatic acid is not Kosher Certified. However, muriatic acid, including the equipment used in its manufacture, does not come into contact with or contain any animal by-products, animal fats, or animal products, nor does it contain chemical additives that are organic in nature. According to the current policies of the Orthodox Union (OU), muriatic acid is acceptable for use in Kosher-related activities without Kosher certification.
- **Halal Certification** - Westlake's muriatic acid is not Halal certified. However, muriatic acid does not contain alcohol, natural L-cysteine extracted from hair or feathers, animal fats and/or extracts, blood of any origin, blood plasma, or pork/or other meat byproducts. Alcohol is not used as a processing aid. As such, this product may be acceptable for Halal consideration.

Additional Product Information

- **Source** - Muriatic acid is derived from mineral and petroleum sources and has not been derived from plant, animal, synthetic, or fermentation sources.

- **Allergenic Materials** -

  The following allergenic materials are not used in the manufacture of muriatic acid:

Potential Allergen	Including
Bee Products & Derivatives	honey, pollen, propolis, royal jelly
Buckwheat Products & Derivatives	
Celery Products & Derivatives	celery seeds
Cocoa Products & Derivatives	
Coconut Products & Derivatives	
Crustacean Products & Derivatives	crab, crayfish, lobster, shrimp/prawn
Dairy Products & Derivatives	cow's milk/cream, goat's milk/cream, powdered milk, butter/butter solids, butterfat, buttermilk, milk fat, casein, whey, curds, custard, cheese, yogurt, lactalbumin, lactoglobulin, lactose
Egg Products & Derivatives	albumin, egg whites, egg yolks, eggnog, ova albumin, ovomucoid, powdered eggs, mayonnaise, meringue
Fish Products & Derivatives	abalone, anchovy, bass, cod, flounder, herring, mackerel, pollock, salmon roe, sardine, tuna, whitefish
Fruit Products & Derivatives	apple, apricot, banana, cherry, grapefruit, kiwi, orange, peach, plum, tomato
Grain Products & Derivatives	wheat, rice, rye, oats, barley, spelt, kamut
Cinnamon Products & Derivatives	
Legume Products & Derivatives	alfalfa, beans (green, kidney, lima, navy, wax)
Carob	
Lentils	
licorice	
locust bean gum	
Peas	
Lupin Products & Derivatives	
Meat Products & Derivatives	beef, chicken, pork
Mollusk Products & Derivatives	abalone, clam, cuttlefish, mussel, octopus, oysters, periwinkle, sassia scallops, snail, squid, whelk
Mushroom Products & Derivatives	matsutake
Mustard Products & Derivatives	
Peanut Products & Derivatives	peanut butter, peanut meal, peanut protein, peanut flour
Plant Nuts/Seeds/Oils	safflower, canola
Potato Products & Derivatives	
Seed Products & Derivatives	cotton, poppy, sesame, sunflower
Protein Hydrolysates, Soybean Products & Derivatives	soy, miso, tofu, bean cured, edamame, isolated soy protein, hydrolyzed soy protein, textured soy protein, soy milk, soy sauce, soy nuts, soy flour, soy lecithin
Spices	
Sulfates/Sulfites & Derivatives	sulfur dioxide, sodium metabisulfites, sodium bisulfite
Tree Nut Products & Derivatives	almonds, brazil nut, cashew, chestnut, filberts, hazelnut, hickory, macadamia, pecans, pine nuts, pistachio, queensland nut, walnuts
Yam Products & Derivatives	

- **Additives/Preservatives/Flavorings** - The following are not used by Westlake facilities in the manufacture of muriatic acid:

Adipate	Ethylene Oxide	PAH
Artificial Colors/Color Additives	Free Glutamate	Phosphates
Benzopyrene	Gelatin	Phthalates
BPA (Bisphenol A)	Hormones	Potassium Bromate
Caramel Color	Iodine	Psyllium
Chloramphenicol	Jatropha Plant	Sodium Benzoate
DEHP	Lactose	Sorbic Acid
Diacetyl	Latex	Starch
Diethylene Glycol	Maleic Acid	Sudan Red
Dioxin	Melamine	Titanium Dioxide
Diphenylamine	MSG	4-Methylimidazole
DMAA	Palm Oil	
Dyes/Food Dyes	Parabens	

- **Bovine Spongiform Encephalopathy** - Muriatic acid is not of animal origin, and, to Westlake's knowledge, does not contribute to Transmissible Spongiform Encephalopathy (TSE)/Bovine Spongiform Encephalopathy (BSE).
- **Genetically Modified Organisms (GMOs)** - Muriatic acid is not manufactured with and does not contain genetically modified organisms.
- **Natural Latex Rubber** - Muriatic acid is not manufactured with and does not contain natural latex rubber as defined in 21 CFR 801.437(b)(1).
- **Nutritional Value** - Muriatic acid does not have nutritional value.
- **Partially Hydrogenated Oils (PHOs)** - Muriatic acid is not manufactured with and does not contain Partially Hydrogenated Oils (PHOs).

Product Stewardship

Westlake Chemical is committed to managing muriatic acid so that it can be safely used by its employees and customers. Westlake's relationships with its customers encourage communication about safety and environmental stewardship.

Additional Information

For more information regarding Westlake's muriatic acid, contact us by calling 1-800-321-8550

References

- Westlake Chemical website: www.westlake.com

Notice

Prior to its use, the user is responsible for determining the suitability of the product or products covered by this Product Stewardship Summary and for complying with all federal, state, and local laws and regulations in connection with its use. Neither Westlake Chemical nor any of its affiliates shall be responsible for any damages of any kind whatsoever resulting from the use of or reliance on this Product Stewardship Summary or product or products to which it refers.

This Product Stewardship Summary is intended only to provide a general summary of the potential hazards associated with the product or products described herein. It is not intended to provide detailed information about potential health effects and safe use and handling information and, although Westlake Chemical believes this information is correct, Westlake Chemical makes no warranties as to its completeness or accuracy. Appropriate literature has been assembled which provides information concerning the health and safety precautions that must be observed when handling the Westlake Chemical product(s) mentioned in this document. Before working with any of these products, users must read and become familiar with the available information on product hazards, proper use, and handling. Information is available in several forms, such as SDS and Product Labels. A copy of Westlake's SDS for muriatic acid can be obtained by going to the company's website www.westlake.com.

This information is subject to change without notice.

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